

# Wireless Networked Cryogenic and Minimum Pressure Sensors, Phase I

Completed Technology Project (2018 - 2019)



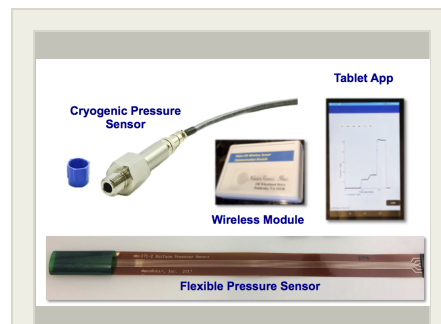
## Project Introduction

This NASA Phase I STTR program would develop high performance, wireless networked cryogenic and minimum pressure sensors for remote monitoring in propulsion systems, using SOI (Silicon on Insulator) NM (nanomembrane) techniques in combination with our pioneering ceramic nanocomposite materials. We will improve the current mechanical and electrical model of semiconductor nanomembrane based sensor performance that will allow quantitative optimization of material properties and suggest optimal methods for sensor attachment and use for 1) cryogenic and 2) purge-box minimum pressure measurement applications. We will perform synthesis of sensor materials with optimized transduction, hysteresis and environmental properties, specifically for cryogenic and minimum pressure, and also varying temperature use. Support wireless electronics will be developed to acquire, multiplex, store and process raw sensor array data.

## Anticipated Benefits

The commercialization potential of the pressure sensor technology lies in four areas, 1) sensors for the measurement of pressure at cryogenic temperatures, 2) low cost simple pressure sensors for the verification of purge gas pressure inside instrumentation boxes, 3) the data processing and wireless communication modules, and 4) the software apps.

The sensor elements may be used as air flow or water flow devices in systems where either low weight, low surface profile, lack of need for space below the flow surface, or high sensitivity at a low cost are needed. Broader commercial sensor opportunities including oil and gas pipeline monitoring and biomedical channel measurement would be considered.



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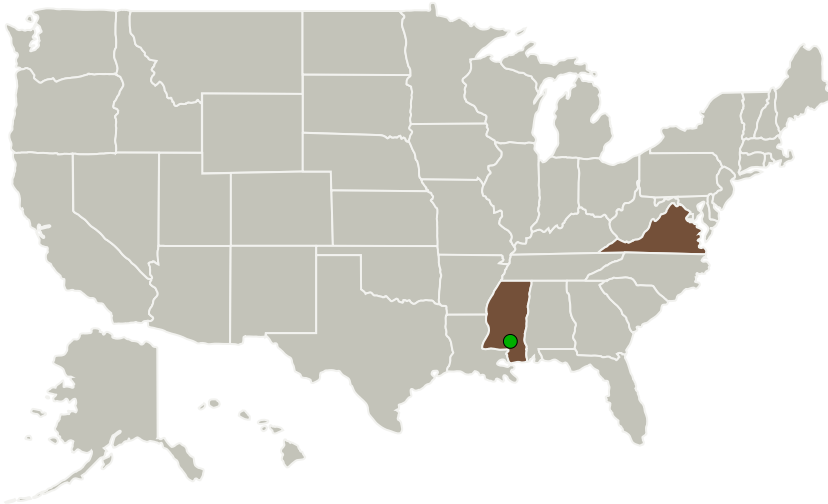
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## Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Nanosonic, Inc.	Lead Organization	Industry	Pembroke, Virginia
● Stennis Space Center(SSC)	Supporting Organization	NASA Center	Stennis Space Center, Mississippi
Virginia Polytechnic Institute and State University(VA Tech)	Supporting Organization	Academia	Blacksburg, Virginia

Primary U.S. Work Locations	
Mississippi	Virginia

## Project Transitions

**July 2018:** Project Start

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

Nanosonic, Inc.

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

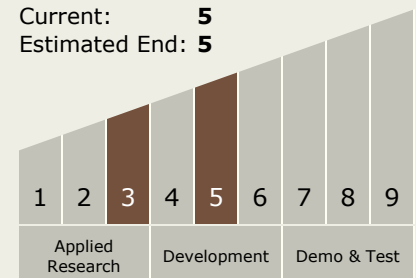
Carlos Torrez

**Principal Investigator:**

Hang Ruan

## Technology Maturity (TRL)

Start: **3**  
 Current: **5**  
 Estimated End: **5**



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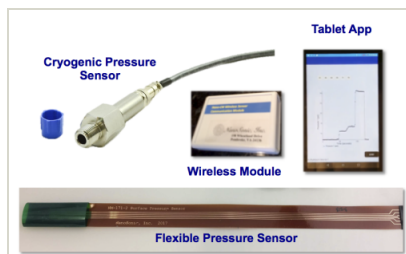


✓ **August 2019:** Closed out

## Closeout Documentation:

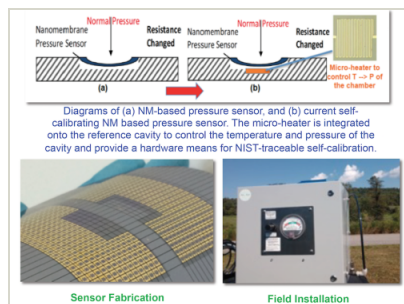
- Final Summary Chart(<https://techport.nasa.gov/file/140148>)

## Images



### Briefing Chart Image

Wireless Networked Cryogenic and Minimum Pressure Sensors, Phase I  
(<https://techport.nasa.gov/image/129872>)



### Final Summary Chart Image

Wireless Networked Cryogenic and Minimum Pressure Sensors, Phase I  
(<https://techport.nasa.gov/image/131372>)

## Technology Areas

### Primary:

- TX02 Flight Computing and Avionics
  - TX02.1 Avionics Component Technologies
  - TX02.1.8 Wireless Avionics Technologies

## Target Destination

Earth